THE MILITARY MANPOWER BURDEN AND THE ESTIMATION OF SOVIET FORCE SIZE

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The true size of the Soviet armed forces has always been an object of interest and speculation.[2] Within the Soviet Union it has become an increasingly important policy variable. Labor, far from being the almost limitless resource upon which the first wave of extensive Soviet growth was based, has become a constraint on growth in the Soviet economy. At the same time, the manpower demands of the Soviet military have increased. The inherent conflict in allocating manpower between the civilian sector and military uses is exacerbated by unfavorable demographic trends, systemic inefficiencies in the allocation and utilization of labor, and unfavorable trends (from the standpoint of the largely Russian leadership) in nationality and skill composition. In addition, as the size of forces increases, costs for procurement, operation, and maintenance of the hardware necessary to equip these forces also increase.

Estimation of Soviet military manpower has also been a preoccupation of Western observers charged with ascertaining the nature of the threat facing the Western alliance, as well as of those interested in estimating the overall burden that Soviet defense efforts impose upon the economy. The improved prospects for negotiating cuts in the size of conventional forces further serve to raise the importance of having reliable estimates of the actual size of Soviet and other Warsaw Pact forces.

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[2]This paper incorporates research presented more fully in *The Economic Cost of Soviet Military Manpower Requirements,* by Steven W. Popper, RAND Report R-3659-AF, March 1989. It will appear in *Perestroika and Soviet Defense Policy,* Kenneth Currie and Charles Duch, editors.

This paper will report results from a simple exercise. It compares demographic data and information on the conscription and manpower management institutions of the Soviet military to estimates of Soviet military manpower levels. In passing, the paper will examine the apparent paradox of increasing force size at a time of declining draft-age cohorts. Three estimates of Soviet force size will be examined. The lowest of these three series will be used in an exercise to fit the estimates to the other information presented. As a general principle, when alternative assumptions are available, those that are most conservative, in the sense of being least restrictive to Soviet interests, will be used. Even so, the demographic and other data will suggest that current estimates of Soviet force size may be subject to overestimation.

DEMOGRAPHIC ANALYSES OF THE SOVIET POPULATION

The first demographic echo from the losses suffered during World War II began to appear as a downturn in the size of draft age cohorts in the early 1960s. This echo coincided with a Soviet decision to reduce the level of military manpower. The reason Khrushchev offered for the reduction was that the emerging importance of the strategic forces reduced the need for such a massive conventional force. However, the demographic balance must have weighed heavily in the decision to build down.

In the early 1970s, Western students of Soviet demographics began to speak of a coming manpower crunch in the 1980s as the second echo of the war losses began to appear. The second echo was not estimated to be as severe as the first in terms of absolute decline in the number of young (male) adults. However, the situation would be considerably exacerbated by two important developments. The first would be the changes in the nature of labor demand brought about by a further two decades of industrial development in the Soviet Union. Shortages in the industrial labor force would be an active constraint on the ability of the Soviet economy to grow. The second was the fact that during the

1970s and into the 1980s Soviet military forces appeared to be undergoing considerable expansion as well as force modernization. How were both the military and industrial maws to be adequately fed?

In general, earlier demograpnic projections by Western analysts estimated that the demographic downturn of the 1980s and the subsequent recovery would be more exaggerated than indicated by the more recent projections. Figure 1 shows two series of demographic estimates and projections generated by the U.S. Bureau of the Census, those current in 1982 and the most recent ones.[3] The estimates and projections differ in the nature of the extrapolation methods used and in updates of information on mortality (which has an immediate effect on projections) and fertility (which has longer-run implications for demographic

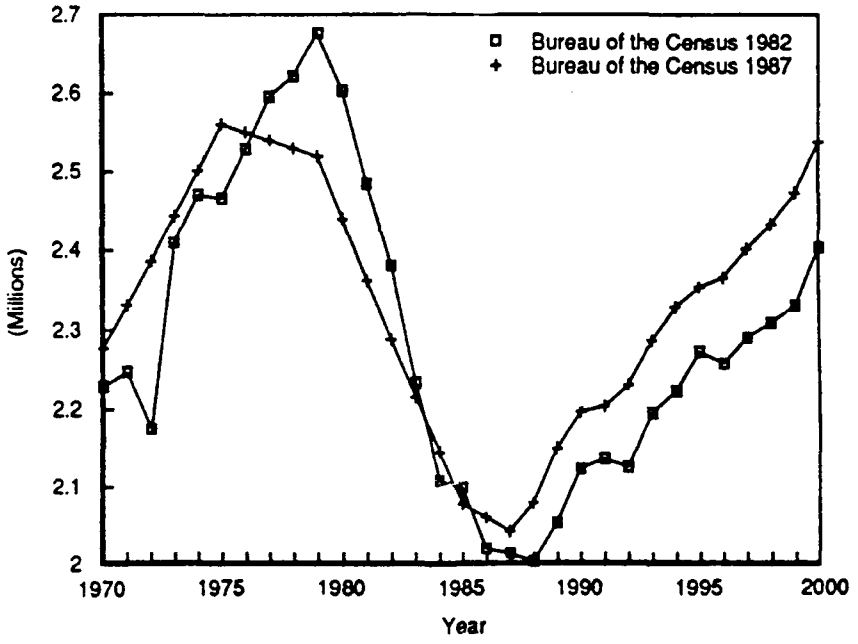

Fig. 1--Soviet demographic projections: Number of 18-year-old males by year

[3]The sources for the 1982 series are DIA, 1984; Rapawy and Baldwin, 1982. The sources for the 1987 series are Kingkade, 1987, and data provided on tape by the Soviet Branch, Center for International Research, U.S. Bureau of the Census. Note that the points for the 1987 series between the years 1970, 1975, 1980, and 1985 are my straightline interpolations.

projections). The 1987 series shows a demographic dip of less amplitude and earlier recovery than does the 1982 series.

The general shape of the two series is similar. Both find the crisis of the downturn to be occurring in the years 1987 and 1988. This paper will use the more recent of the two demographic series in the analysis.

THE INSTITUTIONS OF THE SOVIET MILITARY

Soviet forces are generally fairly junior--conscript-intensive with short average terms of service--compared with most Western armed forces. Estimates of military personnel suggest that at any given time 20 percent are officers, 3-4 percent are cadets in service academies,[4] and 5 percent are career (second term or greater) enlisted men (A. Smith, 1980).[5] This means that at least some 70 percent are conscripts.

The officer and cadet corps, amounting to 23-24 percent of total military manpower, is exceptionally large. The figure probably represents a reasonable upper bound. Similarly, although the figure of 5 percent for long-term enlisted personnel is low by Western standards, it seems to accord well with our institutional knowledge of the Soviet armed forces. Therefore an estimate of 70 percent conscripts would seem to be conservative. The actual percentage could be higher.[6] At the current manpower levels estimated for Soviet forces by Collins and Victory (1987), a 1 percent difference between the estimated and actual fraction of conscripts would change the military requirement for recruits by 26,000 a year. This is a bit over 1.4 percent of the recruit intake estimated for 1987.

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[4]If officers serve for 20 years, then the annual accession rate to maintain an officer corps of 1,000,000 is 50,000. Therefore, there could be from 150,000 to 200,000 cadets in military academies.

[5]"Men," because only about 10,000 women serve in the peacetime forces (Jones, 1985).

[6]Feshbach and Rapawy, 1976, estimate the share of conscripts as 75 percent.

Draftees are conscripted under the 1967 Law on Universal Military Service. The law cut the prevailing induction age from 19 to 18. Thus conscription begins at an age less detrimental to the national economy as it is likely to occur at a less disruptive time of life. The legal vulnerability to conscription was extended through age 26, providing a much larger and more stable pool to draw on, if need be, than was the case before 1967. At the same time the period of service was reduced from three or four years, depending on service branch, to two or three years. The justification for the latter change is that it is easier for the better educated conscripts of today to master the necessary military skills more rapidly (Collins, 1980). The effect is to create a large pool of reservists. Call-ups are not continuous during the year but are conducted twice annually (previously only once) in spring and autumn. This means that twice a year the armed forces lose a bit less than 25 percent of their trained inductees.

It is not known what percentage of eligible males are conscripted annually. The 1967 law does allow flexibility in discharge times. A conscript may be retained for as long as five months after the normally mandated time of service, and time may be forgiven as well, resulting in early discharge. This could provide some flexibility to fulfilling military manpower requirements.

ESTIMATE OF SOVIET MILITARY MANPOWER

The actual size and structure of Soviet forces are the most uncertain parts of the puzzle. The two estimates cited most often are the series constructed by the International Institute for Strategic Studies (IISS) for their annual *Military Balance* publication, and the studies produced by John Collins of the Congressional Research Service. The 1987 edition of *Soviet Military Power* of the Department of Defense (DoD) also provides a single total estimate of Soviet military personnel strength not broken down by service arm or type (DoD, 1987).

This study will utilize the Collins estimates.[7] There is some

[7]The source of the estimates of Soviet manpower presented in Collins is The Defense Intelligence Agency (1980, p. 427). Some data differ in detail from classified documents but portray dependable patterns (p. 425).

difference between these, and those of IISS in the absolute size of military manpower levels, but little in their rate of increase. The Collins numbers are more consistent by year and are presented in a manner more readily useful for the present purpose because they distinguish between combat and support troops for each service branch. Using these as the standard numbers for this study is to state the Soviet manpower problem conservatively as the IISS numbers are higher if the broadest definition of Soviet military forces is used.

The actual magnitude of the increase in overall military manpower levels during the period 1970-1986 depends on the definition of what constitutes the military. Because a major effect of the military draft is to remove workers from the labor force, the wide interpretation (congruent with the Soviet definition under the 1967 Law on Universal Military Service) is used to assess economic effect. In addition to the five main combat service branches,[8] this would include the military units of the KGB, the militarized police units of the MVD, and the uniformed full-time civil defense troops, all of which require conscripts. This yields an overall 21.5 percent increase in the size of the Soviet military over the period 1970-1986 when command and support troops are included. In terms of assessing political influence and threat, the narrow definition, limited to the five combat service branches, would be operative. These branches have seen an increase of 17.8 percent. Table 1 provides data on the increase in total military manpower levels using the broad definition.

The combat troops include the personnel assigned to the operational units of the Strategic Rocket Forces, the Ground Forces, the Air Defense Forces, the Air Force, and the Navy, as well as the military units of the KGB and the internal police. In 1986, these services accounted for 3,904,000 personnel.

The category of general and support troops includes Ministry of Defense, branch, service, and military district headquarters personnel, special and administrative forces, rear service support forces, civil defense, construction, railroad, and billeting forces. The data in the

[8]The Strategic Rocket Forces, the Ground Forces, the Air Defense Forces, the Air Force, and the Navy.

Table 1

BUILDUP OF SOVIET MILITARY MANPOWER, 1970-1986
(THOUSANDS)

Year	Manpower[a]			Ratios of Support to Total	Overall Increase Since 1970
	Combat	Support	Total		
1970	3165	1341	4506	0.30	0
1971	3258	1338	4596	0.29	90
1972	3293	1337	4630	0.29	124
1973	3371	1341	4712	0.28	206
1974	3479	1333	4812	0.28	306
1975	3401	1362	4763	0.29	257
1976	3487	1384	4871	0.28	365
1977	3498	1369	4867	0.28	361
1978	3453	1391	4844	0.29	338
1979	3432	1390	4822	0.29	316
1980	3445	1382	4827	0.29	321
1981	3562	1708	5270	0.32	764
1982	3589	1566	5155	0.30	649
1983	3686	1569	5255	0.30	749
1984	3816	1572	5388	0.29	882
1985	3857	1579	5436	0.29	930
1986	3904	1574	5478	0.29	972

SOURCE: Collins, 1980, 1985; Collins and Victory, 1987.
[a]Includes five service branches and KGB and MVD military formations.

IISS annual series suggest that these forces were not counted rigorously by Western analysts before the late 1970s. When they began to be estimated and included, their size accentuated the increase in Soviet military manpower levels that had been detected. The estimate for these troops given by Collins for 1986 is 1,574,000, yielding a total for Soviet military manpower of 5,478,000.

The IISS estimate of total Soviet military manpower for 1986 is 5,850,000 if border troops, internal troops, and the troops assigned to civil defense are included as they are in the Collins figures.

Similarly, *Soviet Military Power* says that "Soviet Armed Forces personnel strength currently exceeds 5.8 million" (DoD, 1987, p. 97). The interpretation of this passage is problematic. Throughout the publication, the Soviet armed forces appear to be restricted to a narrow definition, not including the border, internal, and civil defense forces (see, e.g., DoD, 1987, pp. 18-19). If this restriction also applies to the total manpower figure given, and we use the very similar estimates of Collins and the IISS for manpower in those forces, which must be added to the five combat service branches to yield the wide definition of Soviet military manpower, this implies an estimate more in the range of 6.3 million.

Several factors have contributed to the increase in Soviet military manpower. One is that the fundamental table of organization of major operational units was changed in the early 1980s, placing more men in tank and motorized rifle divisions (although reducing the size of airborne divisions). Another is that the number of divisions increased. The absolute number of divisions that are estimated for Soviet Ground Forces differs according to the source used, but their increase in number from 1970 to 1986 is generally agreed to be on the order of 50 tank and motorized rifle divisions, 35 or so since 1975. This study considers how it has been possible for the Soviets to manage this substantial increase, given what we know of Soviet military institutions and the declining demographic trend.

THE MANPOWER PINCH

As noted above, an average of 70 percent of Soviet military manpower is assumed to be made up of conscripts; for no less than 90 percent of the conscripts the term of service is assumed to be 24 months, and for 10 percent the term is 36 months.[9] Therefore, the average term of service is 25.2 months.

[9]Conscripts on board naval vessels or serving in coast guard combat units or maritime border units are required to serve 36 months. This probably amounts to somewhat less than 10 percent of all who serve, so this assumption is, again, a conservative one.

Combining these assumptions with the most recent data on the size of the Soviet military, using Collins and Victory (1987) as a source, suggests that the Soviet military's demand for conscripts for 1987 is 1,826,000. The U.S. Bureau of the Census currently estimates the total number of 18-year-old males for that year as 2,043,000. Therefore, to satisfy the demand implied by the estimates of the current Soviet force structure would require the induction of 89.4 percent of the class of 1987. With the IISS estimates of current Soviet force structure, the need would be for 97 percent inductions.

Such invasive depredations by the military upon the annual increment to the draft-age pool would be difficult to imagine even in the course of a major wartime mobilization. By comparison, the medical evaluation standards for U.S. conscription practices set in 1963 would yield a combined medical and moral disqualification rate of 20 percent (Collins, 1980, p. 97).[10] It is difficult to believe that the Soviet peacetime rate could be any less than half of this number, say 10 percent (but probably closer to 15 percent).[11] This means that current Soviet military manpower requirements demand the absolute, theoretical maximum conscription rates to meet military needs. Indeed, even these may not be sufficient.

The Soviets do, however, offer deferments for several reasons besides ill health and medical liability. There is a second group of deferments on the grounds of family hardship, including deferments in the case of disabled and dependent parents, dependent children (two or

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[10]During the height of the U.S. manpower crunch in 1944-45, 14.0-17.1 percent of all 18-25 year olds were classified as IV-F (Blum, 1967, p. 157). The actual rate of IV-F deferments for 18-year-olds in the years 1965 through 1968 was about 25 percent. About half that number were classified as available for conscription in the case of a national emergency (Gerhardt, 1971).

[11]Officials of the Moscow military registration and enlistment office recently criticized the conscripts who arrived at the city's induction center saying that many do not meet the "fit for labor and defense" standard. The article states that, "almost 12 percent are discharged from military service each year for health reasons" (*Pravda*, 18 May 1987, p. 4; reported in JPRS *Soviet Union: Military Affairs*, 8 July 1987, pp. 47-51).

more) or disabled wife; deferment for sons whose mothers are unmarried and have two other children under the age of eight; and deferment for sons with dependent siblings under the age of 16 or with disabled siblings of any age with no one to care for them.[12] These provisions probably do not affect a large number of 18-year-olds but would become more important for the older members of the draft-age pool. Ellen Jones estimates that 3-10 percent of the otherwise eligible pool may be exempt for family reasons (Jones, 1985, p. 54).

Besides family hardship, there are also possibilities (formal as well as informal) for deferment on the basis of occupation, criminal activity, and participation in court proceedings. All of these nonmedical deferments together may amount to a further deferment rate of 4-5 percent.[13]

The Soviets have in the past offered deferments to full-time students in higher educational institutions and in specialized secondary and vocational training schools. Many of these were subsequently called up, but not all. As many as 300,000 per year may, in effect, have been exempted from callup for service (Collins, 1980, p. 97). When translated into a fraction of 18-year-olds, this meant another 15 percent deduction from the age cohort. That accords with intuition. Total induction rates of 70-75 percent would seem to be about the largest callup rate that would be supportable without undue hardship under peacetime conditions.[14]

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[12]*Chelovek i Zakon*, No. 2, February 1984, pp. 55-60, in JPRS *USSR: Military Affairs*, 9 May 1984, pp. 55-61.

[13]This is implied by the calculations in Feshbach and Rapawy, 1976.

[14]Again by way of comparison, the U.S. manpower crunch in 1944-45 was viewed at the time as being quite serious. It prevented the number of military units and actual number of men under arms from achieving the planned levels. It also, at the same time, caused serious dislocations in many priority industries. During this time, 73.6 percent of all registrants aged 18-25 years were classified as available for conscription. This means, of course, that the actual rate for 18-year-olds alone must have been higher, but the figure is the maximum percentage of those eligible for conscription, not those actually selected (Blum, 1967, p. 157).

In recent years, the Soviets appear to have drastically curtailed the number of student deferments.[15] For present purposes, whereas the student deferment rate might have amounted to some 13-15 percent before 1982, the current rate may be anywhere from 0-5 percent. For the purpose of discussion I have settled on 2 percent. Putting all current sources of deferments together, while tending toward conservative estimates where required, suggests that the maximum rate of deferments, stated in terms of the class of 18-year-olds, would be in the neighborhood of 16-17 percent, leaving 83-84 percent available for conscription.

High callup rates for a trough year aside, the historical data illustrate the long-term nature of the problem for the Soviet Union. Figure 2 shows the induction rate for 18-year-olds, 1970-1986, derived from the Collins military manpower numbers and the assumptions outlined above. During the entire period from 1970-1980, callup rates were consistently around 65 percent of the annual 18-year-old class, what we might term the "historical" rate. After 1980, the increase in necessary projected conscription has been great, easily passing the maximum 70-75 percent rate obtaining in the era of wide student deferment, and by 1983 even exceeding the revised maximum rate of 83-84 percent calculated above that takes into account the more draconian deferment policies of recent years. Figure 3 projects the necessary conscription rate that would be required to maintain the 1986 Soviet estimated force structure to the year 2000. Only at the end of the millennium will callups come back to something approaching the "historical" callup rate.

The reality of this apparent paradox must be better understood. The demographic downturn of the 1980s might have suggested a priori that the reality of the manpower shortage would force a partial builddown of Soviet forces during the course of that decade. Instead, the bulk of the observed increase since 1970 occurred in the 1980s. Are the Soviets sufficiently insensitive to manpower opportunity costs that we cannot project changes in their force posture based upon what we know of the

[15] See Popper (1989) for a detailed discussion of student deferments and their cost.

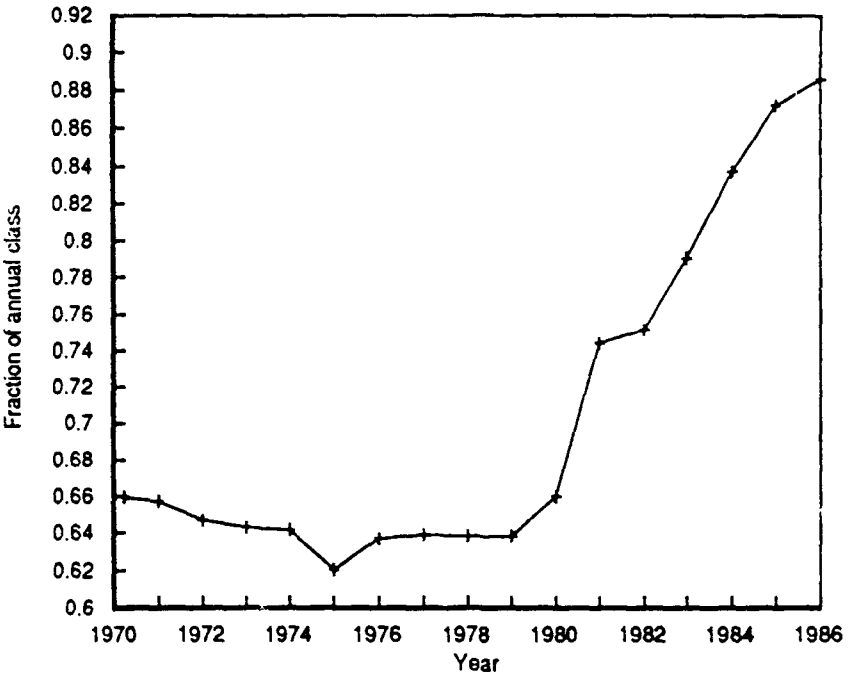

Fig. 2--Estimate of callup rates for 18-year-olds, 1970-1986

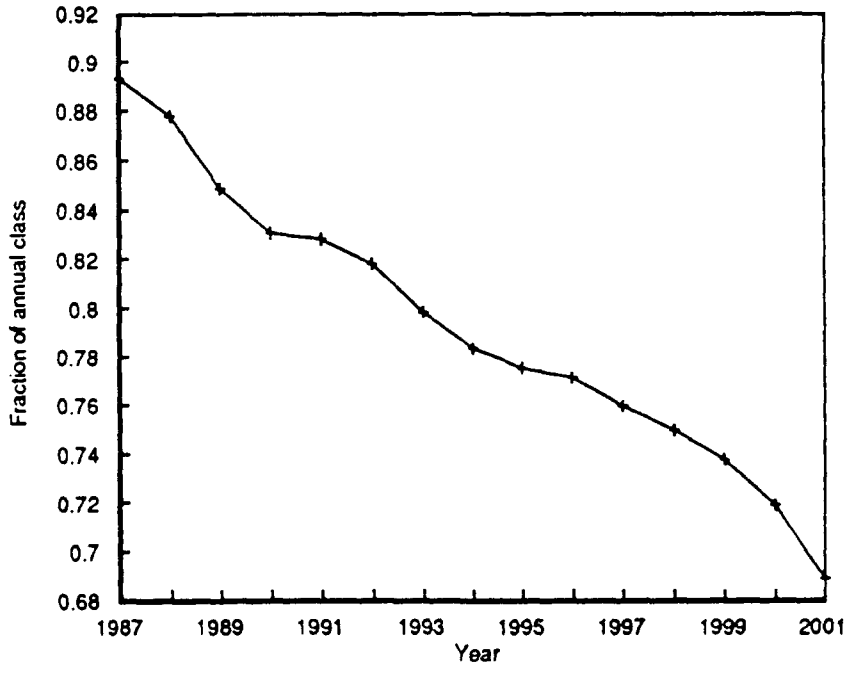

Fig. 3--Projection of callup rates for 18-year-olds, 1987-2001

exigencies of the civil economy (military/political needs are the fixed points around which all else must be arranged)?[16] Or does it suggest that the analysis is at least partly erroneous and that the military buildup was not as costly as these figures make it appear? These questions must be addressed to enable us to make predictions about forces based upon the need for economic tradeoffs or to assess the costs to the economy of maintaining these forces.

POSSIBLE MEANS FOR ALLEVIATING THE MANPOWER PINCH

Allocation of Manpower Within the Military Establishment

A hypothesis consistent with the data for at least the years from 1970 through 1980, and perhaps from as early as 1960 through 1980, is that the size of the forces is made to conform to both the available manpower pool and a given rate of conscription considered to be socially desirable and economically acceptable. During this period, military manpower was built up at a rate to match the increased size of draft-age cohorts (see Fig. 3). In other words, unlike the West where force building proceeds from the desired force composition to determine the manpower required, the supply side could have been playing a larger, perhaps even a dominant role in the process in the Soviet Union. Military service may have been viewed, in part, as a social or political good in itself. The implication, if the hypothesis is correct, is that the analyst must exercise caution in gauging the range of policy options the Soviet leadership would actually employ to reduce the conscription rate below some threshold. That might not be a highly desired goal in itself. The Soviet leadership may not consider filling the military manpower requirement to be quite the same burden that it appears to be to a Western analyst.

The logic inherent in the 1967 Law on Universal Military Service would seem to support this view. Although calling up a large draft-

[16]This is to ignore the possibility that changes in the civil economy (mechanization, de facto postponement of retirement, etc.) might have reduced the need for labor inputs.

age cohort imposes a burden on the economy, the institution of conscription in itself is beneficial to the regime. The process increases and stabilizes the pool of trained reservists and provides a venue for intense political indoctrination. It also socializes young men by emphasizing the needs of the collective over the individual, provides some basic education in Russian and other useful nonmilitary skills, and shows recruits from labor-rich republics other parts of the country, possibly increasing the mobility of labor. It is by design that the manpower needs of the Soviet armed forces are filled by a system that is conscript-intensive and has the widest possible effect upon the pool of available 18-year-olds. It is not certain that the perception of a reduced external threat would lead to a reduction in the ratio of callups to eligible manpower below a certain level.

If supply-side considerations have indeed played some part in forming Soviet conscription practices, the logic of the policy would demand a reduction in the number of men under arms during the demographic downturn of the 1980s. That does not appear to have occurred. One possible explanation is that what began in 1967 as a deliberate policy resulting in increased military manpower in the face of a demographic upturn may have taken on an institutional life of its own, as did so much else in the Soviet Union by the late 1970s, the period of late-Brezhnevism. In the face of increased commitments abroad during the course of the 1970s, a renewed challenge from the United States, an unwillingness to face the hard decisions necessary to run the policy in reverse, and a situation where the priorities and prerogatives of the military appear to have been strong enough to gainsay attempts at retrenchment, military manpower was not decreased and forces were even enlarged. The mechanisms used to adopt the policy, remains. However, under normal circumstances, two mechanisms might be used to adjust military utilization of conscript resources if the process is actually driven by supply to as large an extent as demand, or larger. The first applies to the most manpower-intensive branch, the Ground Forces. This refers to the familiar system of maintaining units at different levels of their authorized strength. Divisions may be at one of three readiness states.[17] The mix among these three types may be altered. This could have an effect upon manpower requirements.

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[17]The most common classification scheme has been the one where divisions of Category I have 75-95 percent of their full manpower

As noted earlier, one of the more dramatic manifestations of the Soviet buildup since 1970 is the increase in the number of divisions in the Soviet Ground Forces. This buildup has a direct effect on the ability of the Soviet Union to project an image of strength and to provide a greater potential for intimidation by virtue of the presence of this force on the Soviet borders and in the Central Region in Europe. Considering only the manpower required, if we make the rough assumptions that each tank or motorized rifle division has 12,000 men at full strength and that the Category I and II divisions have, on average 80 percent of full strength and those of Category III have 15 percent, then the total manpower required for the 35 division increase that has been observed since 1975 is slightly under 110,000.[18] If the ratio of cadre to ready divisions remains constant, this leverage will operate as strongly to prevent a large downturn in manpower levels in the case of deletions of divisions from the order of battle.[19] Given that there are some 200 divisions in the Soviet Ground Forces, a great reduction in nominal division number, on the order of 35 divisions, would not greatly alter the manpower requirement.[20] What they may mean is that a nominal

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complement, those of Category II 50-75 percent, and Category III 10-20 percent. This has been superseded by a more detailed scheme of classification, but the Category I-II-III form is the one still used by the sources drawn upon in this study.

[18]There are two major complications to this simple calculation. First, most divisions were reorganized in 1982 yielding a formal increase of 500 men for each motorized rifle division and 2,000 for tank divisions. If we use the actual establishment strengths rather than an average for the period, the total increase to 1986 would require about 175,000 men. Second, a considerable portion of the Ground Forces manpower lies in nondivisional combat assets and in command and support units. Therefore, the manpower required to increase the size of the Ground Forces by the number of divisions added since 1975 will be greater than the figures given here if the Ground Forces command considers it necessary also to increase the presence of nondivisional units in some rough proportion. The problem, in this case, is in determining whether the manpower required by such auxiliary formations is large if they are added in proportion to the number of division-level headquarters, or small if they are added only in proportion to average readiness status or men under arms.

[19]The ratio need not necessarily remain constant. Modification of the ratio could potentially confer a great degree of flexibility in Soviet force building.

[20]The current estimate places the size of the Ground Forces at over 3 million.

reduction in Soviet Ground Forces may be unlikely in the near term at the divisional level. There may be reductions in the number of lower echelon units or de facto changes in the readiness level of units, both of which would be more difficult to detect by foreign analysts.

The increase in the size of Soviet forces could have been partly a consequence of an independent decision to modernize them. This proposition rests upon two observations. The first is that Soviet forces are not homogeneous in their equipment and may have grown more heterogeneous since 1970. A decision to modernize forces need not imply that all forces are to be modernized; only a portion of forces need be affected. Second, given the institutions that exist in the Soviet Union for the design and production of new weapons systems, a decision to modernize in a fundamental fashion would lead to a great increase in the amount of military hardware in existence.

The most apparent indication of Soviet force growth since 1970 has been the increase in the number of divisions in the Ground Forces. Impressive and politically useful as this is, the increase may have been cheaply bought. Considering just the divisions themselves and ignoring support elements, the increase in the number of category I and II divisions was on the order of 8 percent, and those of category III showed a 29 percent increase (Collins, 1980, 1985).[21] Category III divisions are mostly equipped with hardware that has been cut out from the stocks of category I and II divisions, so those divisions could be largely equipped without any serious increase in the production of military goods. In fact, the creation of lower readiness divisions might be a natural concomitant to military force modernization, given what is known of the nature of Soviet weapon development and procurement policies. Changes in the characteristics of weapons are most often introduced incrementally in the course of an extensive production run.[22] The tendency is to produce batches of weapons incorporating successive

[21]The latest figures provided by Collins and Victory (1987) indicate that of the 202 active tank and motorized rifle divisions in the Soviet order of battle, 36 percent are estimated to be category I or II and 64 percent are category III.

[22]See Alexander, 1982, for an extensive discussion of this process.

improvements to existing platforms rather than to bring out radically new prototypes. A result of this process is to generate a great deal of hardware. During a period of force modernization, this policy is likely to yield new equipment before the old has reached its full service life, so retirement rates would not keep up with new production. Earlier prototypes and the weapons rendered less effective by the later stages of the development process may then be used for export or to equip the category III formations.

A decision to modernize the Ground Forces can, in a limited sense, be viewed as a decision to modernize only the third that is kept in readiness status, corresponding to categories I and II, making the prospect less expensive. From 1967 to 1977, for example, procurement of equipment (which in the Soviet definition would include more spares and repair costs than would its U.S. counterpart) for the Ground Forces accounted for approximately 10 percent of total defense spending. By contrast, procurement spending for the Air Force and the Navy each was over 15 percent of total defense spending on average (CIA, 1978). However, on the manpower side of the ledger, the Ground Forces accounted for 83 percent (300,000 of 360,000 troops) of the buildup in all service branches, using the wide definition of the military including the internal and border troops, from 1970 to 1977. Some 19 divisions were added as well for a 12 percent increase in the number of standing divisions (Collins, 1980, 1985; Collins and Victory, 1987).

A second major mechanism to adjust demand to conscript supply would be to alter the ratios of military "tooth" to "tail." Noncombatant branches such as railroad, construction, and civil defense troops are included in the category of general and support manpower. The fact that these branches exist under the rubric of the military but are administratively separated from the "shooting army," again differing from typical Western military practice, means that this area could be subjected to large and rapid swings in manpower levels without really affecting the army's muscle. In times when the available supply of conscripts is low, the levels of command and support services could be rapidly changed while the combat arms were insulated from the need to adjust too greatly. Given the wide range of tasks assigned to the

support branches, tasks that vary in their importance to the direct sustenance of the military, the size of these forces may be altered to suit the balance between the force posture of the five service arms and the demographic trends. As has been mentioned, these forces have not received as much attention from Western analysts as have the combat arms until recently, but they are of great importance for this analysis. The data in Table 2 imply that the combat-to-support ratio has remained fairly constant during the period under consideration. Yet most of the numbers for the 1970s are post facto reconstructions arrived at after the rear area forces had been reevaluated by Western analysts in the late 1970s (Scott and Scott, 1979, p. 227). Some circularity may have entered into the estimation of these forces if it is assumed that a tooth-to-tail ratio estimated for one period has held for the full term. That might not be the case.

In addition, in times of extreme crisis some support troops could provide a first pool for adding to the cadre combat units as they are already subject to military discipline even if they are still innocent of actual combat training. For present purposes, it suggests a further sense in which this force might be viewed as a manpower buffer. It allows the leadership to temporarily take on a greater defense role and effectively increase the military by drawing on an internal labor pool that will to an extent be divorced from the civilian labor force. The fact that the greatest bulk of these troops appears to be of non-Slavic origin (exactly the reverse of most combat branches) may render this potential expedient unviable.

When conscripts are plentiful, command and support services could be used as a spillover for excess conscripts. A greater proportion of these troops might be used in civilian construction projects in unsalubrious or otherwise inconvenient locales. They are neither a total loss to the economy nor a direct addition to the military burden.

Both of these potential mechanisms for manpower management, shifting the readiness status of units and altering the size and composition of the support services, carry an implication beyond the question of how the Soviets use conscripts. They suggest that there is room for misassessment by Western analysts of the size of Soviet

military manpower if force estimates are based upon rules of thumb and extrapolations from sporadic observation. In particular, shifts in readiness status of combat formations or in the size of the auxiliary forces would probably be detected only after an appreciable lag. Of the three main areas of information, demographic, institutional, and military manpower estimates, the last of these appear most fragile. This sensitivity stems not from any lack of diligence or persistence on the part of those engaged in the business of estimating the size of Soviet forces and the manpower they include, but rather from the inherently more elusive nature of the facts to be clarified.

Means for Reducing the Conscript Shortfall

Leaving the problems of military manpower estimation aside, how could a force of the size currently estimated be maintained in a period of extended demographic downturn? This discussion will present data on the size of the shortfall in the number of available conscripts to be expected under several assumptions.

Table 2 illustrates the dynamic nature of the shortfall.[23] If we retain the assumptions we have explicitly laid out and extrapolate the "historical" rate of conscription observed during the 1970s that is, no more than 70 percent of each class of 18-year-olds being drafted into the present and future, how great is the annual deficit compared with the number that needs to be conscripted to maintain the estimated military manpower level?[24]

The Collins estimates of the current military manpower level have been used for 1981 through 1986 and then the 1986 force maintained until the year 2000. The first two columns of Table 2 illustrate these

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[23]For greater clarity, the simple arithmetic of conscript supply and demand used to calculate the shortfall in available manpower under various assumptions is presented in App. B.

[24]This is similar in approach to the model developed in the excellent study by Feshbach and Rapawy, 1976. They used a different demographic series and series of military manpower estimates, as well as differing assumptions on deferments, proportion of conscripts in the military, and conscription period. The methodology of modeling conscription of older males also differs.

Table 2

SHORTFALL OF AVAILABLE CONSCRIPTS UNDER ALTERNATIVE ASSUMPTIONS, 1981-2000

	Assuming Conscription of			
	70 Percent of 18-Year-Olds		75 Percent of 18-Year-Olds	
Year	000	Fraction of Requirement	000	Fraction of Requirement
1981	-103	0.06	15	na
1982	-117	0.07	-2	0.00
1983	-201	0.11	-90	0.05
1984	-294	0.16	-187	0.10
1985	-357	0.20	-254	0.14
1986	-383	0.21	-280	0.15
1987	-396	0.22	-294	0.16
1988	-370	0.20	-267	0.15
1989	-321	0.18	-214	0.12
1990	-288	0.16	-178	0.10
1991	-284	0.16	-174	0.10
1992	-264	0.14	-153	0.08
1993	-226	0.12	-111	0.06
1994	-196	0.11	-80	0.04
1995	-179	0.10	-61	0.03
1996	-170	0.09	-52	0.03
1997	-145	0.08	-25	0.01
1998	-123	0.07	-1	0.00
1999	-95	0.05	29	na
2000	-50	0.03	77	na

SOURCES: Collins 1980, 1985, Collins and Victory, 1987; U.S. Bureau of the Census.

[8]Includes five service branches and KGB and MVD military formations.

assumptions. The shortage remains above 10 percent of the total requirement for conscripts for most of the period.[25] If the assumptions change and fully 75 percent of the 18-year-old cohort is taken each year, and the marginally greater damage to the growth prospects for the economy is accepted, then the burden is alleviated somewhat. The

[25]Again, using the Collins numbers represents a conservative assumption. If the higher total estimates of IISS are used instead for the crisis year of 1987, the shortfall is greater than 550,000 conscripts, or 30 percent of the total requirement necessary to maintain the estimated military manpower level.

fractional shortfall, however, will remain above 10 percent until after 1991. This is illustrated in the two right-hand columns of Table 2.

What if a more sophisticated conscription model is employed? Table 2 assumed that only the 18-year-old cohort was called upon to provide conscripts. It is convenient to speak in terms of 18-year-olds as the fundamental unit of account. Anyone who is conscripted at some later age was also once an 18-year-old; the number of 18-year-olds establishes the maximum size of the later-age cohorts. The size of neither this age cohort nor the later ones is constant from year to year. Therefore, if the needs of the military are more widely spread among the age cohorts during a time of demographic trough, the resulting conscript shortfall might be reduced.

Table 3 illustrates the model, presented formally in App. A. According to the 1967 conscription law, the vulnerable ages are 18-26. Naturally, it is least injurious to the economy and the social fabric to take a recruit when he is the youngest and the opportunity cost to society of his induction is least. But the military need must also be considered. Of those who have been deferred, some become available at a later age. The model used to generate the data in Table 3 followed two sets of assumptions. In the first, illustrated by the data in the first two columns, it was assumed that the rate of conscription for 18-year-olds conformed to the "historical" rate of 65 percent. In the second it was assumed that 70 percent of 18-year-olds are conscripted when they become available. For both specifications of the model, 25 percent of those who reach 19 without having been conscripted are then taken into the military, as well as 10 percent of the previously uncalled 20-year-olds.[26] After that it is deemed unlikely that selection of 21- to 26-year-olds is anything but a scattered phenomenon because military value would decline rapidly with increasing age from morale problems, and the cost to the economy would begin to rise.[27]

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[26]The model also assumes an annual mortality rate of less than two per thousand. If the mortality consideration is ignored for the moment, it means that in the first specification 76.4 percent of 18-year-old equivalents are eventually taken by age 20 and, in the second, 79.8 percent is the effective rate of conscription. With mortality taken into account the rates would be slightly greater.

[27]Although it is clear from the outcry in the Soviet press that a

Table 3

SHORTFALL OF AVAILABLE CONSCRIPTS USING THE CONSCRIPTION MODEL FOR 18- TO 20-YEAR-OLDS,

	Assuming Conscription of			
	65 Percent of 18-Year-Olds		70 Percent of 18-Year-Olds	
Year	000	Fraction of Requirement	000	Fraction of Requirement
1981	59	na	171	na
1982	38	na	121	na
1983	-51	0.03	22	na
1984	-149	0.08	-78	0.04
1985	-217	0.12	-148	0.08
1986	-250	0.14	-181	0.10
1987	-265	0.15	-196	0.11
1988	-243	0.13	-173	0.09
1989	-195	0.11	-121	0.07
1990	-157	0.09	-82	0.04
1991	-147	0.08	-72	0.04
1992	-127	0.07	-51	0.03
1993	-89	0.05	-11	0.01
1994	-56	0.03	24	na
1995	-34	0.02	46	na
1996	-23	0.01	57	na
1997	2	na	84	na
1998	26	na	109	na
1999	56	na	140	na
2000	102	na	189	na

SOURCES: Collins, 1980 and 1985; Collins and Victory, 1987; U.S. Bureau of the Census.

[a]Includes five service branches and KGB and MVD military formations.

Table 3 shows that, depending upon assumptions about the rate of callup, this model considerably reduces the shortfall, although it is not eradicated. In the specification assuming a 65 percent callup rate for 18-year-olds, 130,000 more conscripts than in the previous model are found for the crisis year of 1987, although the shortfall is still 265,000 recruits, 15 percent short of the maintenance requirement. The

far from unanimous decision has been taken to reduce the number of student deferments, there has been no similar indication that the induction of older draft-eligible males has increased. This suggests that there is a preference for youth even in a time of shortage, but this proof is by no means conclusive.

year 1987 still sees a shortfall of nearly 200,000 conscripts, 11 percent less than the required number, if they are conscripted at the higher rate of 70 percent when age 18. But only that year and 1986 show a shortfall at the 10 percent level.[28]

Can the newly calculated shortfall of 200,000 conscripts for 1987 under a nearly 80 percent conscription regime be reconciled with the estimated military manpower level, thus resolving the paradox? This figure represents about 3.6 percent of total military manpower. Plus or minus 5 percent would certainly seem to be within the acceptable range for such estimates. The problem, however, is that the direction of error in estimation is biased. As has been pointed out, the Collins numbers upon which these calculations are largely based are on the low side of published estimates of Soviet military manpower. We have also used the most conservative assumptions in the analysis so far. This suggests serious difficulty in accepting the IISS and *Soviet Military Power* estimates, which are higher still.

Another expedient available to the Soviet leadership could aid in managing the shortfall. The terms of service of recruits might be lengthened, thus reducing conscript demand. The 1967 law on conscription allows recruits to be held for up to an additional five months before finally being discharged. What would be the effect on the demand for conscripts if three-year service men were discharged on time but two-year recruits were held for an additional 60 days?[29] This would involve minimal additional injury to the economy. There has been no indication in the Soviet press or from Western observers that such a practice might now be occurring. That is not in itself conclusive, but it is suggestive of the seriousness with which Soviet leaders must view

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[28]Again, if the IISS estimates are used, the shortfall in 1987 is more than 350,000, 18 percent of requirements, even if a 70 percent conscription rate at age 18 (effectively meaning that nearly 80 percent of all those reaching 18 years old will eventually serve) is assumed. The account would not then come into surplus until the year 2000 and would continue to result in a shortfall with respect to the maintenance requirement of 10 percent or greater until 1993.

[29]The choice of 60 days is arbitrary. It seems to be a long enough time to make some difference without being so long that the morale of the soon-to-be-discharged recruits would be too sorely tried.

such an expedient. Nevertheless, the effect of increasing service terms should be explored as part of the analysis of the manpower puzzle.

Table 4 gives a sense of the effect that a 60 day "surcharge" to the time of service would have on the shortfall in conscript supply. The analysis uses the multi-age recruitment algorithm with its most draconian assumptions, taking 70 percent of 18-year-olds as recruits. The result is to further reduce the conscript shortfall to the point where it is not likely to distress Soviet military planners. In other words, if the Soviets are willing to place virtually every able-bodied

Table 4

SHORTFALL OR SURPLUS OF AVAILABLE CONSCRIPTS
USING THE 18- TO 20-YEAR-OLD CONSCRIPTION

Year	000	Fraction of Requirement
1981	323	na
1982	247	na
1983	140	na
1984	42	na
1985	-28	0.02
1986	-59	0.03
1987	-75	0.04
1988	-51	0.03
1989	1	na
1990	40	na
1991	49	na
1992	70	na
1993	111	na
1994	146	na
1995	167	na
1996	179	na
1997	205	na
1998	230	na
1999	262	na
2000	317	na

SOURCES: Collins, 1980, 1985; Collins and Victory, 1987; U.S. Bureau of the Census.

[a]Includes five service branches and KGB and MVD military formations.

male into the service (effectively 80 percent of each age cohort) and extend the service term by two months, then the currently estimated military manpower levels can come very close to being supported adequately.[30]

Soviet callup practices make this expedient a bit less tractable and efficacious than might otherwise be the case. Callups and discharges are not continuous during the year. They occur twice yearly, in the spring and the fall. To hold men longer might create personnel problems, because recruits are usually directly assigned to units. Also, units would again be understaffed when the additional 60 days expired. Extension for the full five months allowed by law would wipe out the shortfall as well as smoothing the problem of "lumpiness," but the morale problems within the military would be severe. Therefore, although this might appear to be an attractive policy in a regime where callups and discharges are continuous, in the Soviet setting the solution is more apparent than real.

The Soviets appear instead to have decided to reduce the number of deferments available to 18-year-olds by cutting back on eligibility for student deferments. The net effect is to increase the conscription share of each draft-eligible cohort. Table 5 illustrates the effect of this practice. In this model, fully 80 percent of all 18-year-olds are conscripted when they first become eligible. The first case reported in the left-hand columns is consistent with the previous ones in that 25 percent of 19-year-olds and 10 percent of 20-year-olds previously deferred are subsequently conscripted. The second assumes that because of a tightening up of deferment standards for 18-year-olds, only 15 percent of the deferred 19-year-olds will be taken. At that rate of conscription for 18-year-olds the effective differential in overall conscription is small. These conscription algorithms imply that 86.5 percent of all eligible males in the first case and 84.7 percent in the second will eventually be conscripted (again, ignoring mortality).

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[30]If the IISS estimates are used, the problem remains. The year 1987 would still see a shortfall of 220,000 recruits (11 percent of requirements), and the shortfall would remain until the year 1994.

Table 5

SHORTFALL OR SURPLUS OF AVAILABLE CONSCRIPTS USING THE 18- TO 20-YEAR-OLD CONSCRIPTION MODEL UNDER

	Assuming Conscription of			
	25 Percent of 19-Year-Olds		15 Percent of 19-Year-Olds	
	Not Conscripted at Age 18			
Year	000	Fraction of Requirement	000	Fraction of Requirement
1981	407	na	334	na
1982	324	na	272	na
1983	207	na	156	na
1984	78	na	37	na
1985	-9	0.00	-47	0.01
1986	-43	0.01	-80	0.02
1987	-59	0.02	-96	0.03
1988	-31	0.01	-68	0.02
1989	27	na	-10	0.00
1990	69	na	30	na
1991	77	na	38	na
1992	100	na	61	na
1993	146	na	106	na
1994	184	na	142	na
1995	215	na	170	na
1996	234	na	187	na
1997	268	na	219	na
1998	303	na	251	na
1999	346	na	291	na
2000	409	na	351	na

SOURCES: Collins, 1980, 1985; Collins and Victory, 1987; U.S. Bureau of the Census.

[a]Includes five service branches and KGB and MVD military formations.

Conversely, it means that deferments of all types medical, moral, psychological, hardship, criminal, occupational, and student, de jure and *de facto* are restricted to only 13.5-5.3 percent.

These are effectively wartime rates of conscription. Indeed, they are scarcely credible. They are matched only by the conscription rates for the Israeli armed forces, whose institutions are in many ways better designed than the Soviet to minimize the economic and social dislocation caused by military manpower demands; and the Israeli rates represent the rates for only the select part of the community not exempted from

conscription. Even under the conscription regime modeled in Table 5 there is a shortfall, albeit a minimal one.

In view of this, the Collins numbers must be regarded as a theoretical upper bound to the size of the Soviet armed forces. Even these are likely to reflect only the ideal condition when all units are staffed at their authorized level of readiness. If the Soviet forces actually do consist of the number of divisions and other large formations represented in the Collins estimates, then it is quite possible that they are not meeting these staffing targets. Thus, the use of the Collins estimates carries an implicit assumption that should be rendered explicit. The discussion proceeds from the supposition, as inferred from the non-decreasing trend in Collins' manpower estimates, that the Soviets have not reduced their force posture to date and that the buildup has been maintained in the face of the manpower pinch. Given the problems of estimation to be considered below, this assumption may be a strong one.

Finally, the conservative nature of this analysis is underscored by explicitly nothing that the entire discussion in this paper has been focused only on the problem of staffing the 70 percent of the Soviet military manpower that is conscripted. The provenance of the 30 percent who are officers or long-term servicemen has been completely ignored.

CONCLUSIONS

It would be just possible for the Soviets to conscript sufficient recruits each year to meet the military manpower numbers estimated by Collins. But it is made only just possible within a construct that utilizes the most conservative, perhaps unrealistic, assumptions if the Soviets used measures just short of those that would be viewed as inexpedient at any time other than during a national emergency. The manpower shortage pinches, but something close to the Collins military manpower projections can be supported. This implies a theoretical ceiling to Soviet forces of under 5.5 million, perhaps well under.

Any estimate of Soviet military manpower calling for an aggregate strength greater than that given by Collins must be held open to serious question. A higher estimate could not be considered if it did not

include an analysis of military manpower management policy that convincingly calls into question the basic assumptions used in this study. Of the three classes of data used in this section, the one that must be considered primary because of the firm foundation of its sources and the general agreement in interpretation of those sources is the demographic. If the level of analysis is made more disaggregate and questions such as the desired ethnic composition of Soviet forces relative to the varying rates of increase for the Slavic and non-Slavic populations are considered, the problem of maintaining even the Collins force structure estimate is once again less tractable.

After the demographics, the institutional insights, gained in interviews with emigres, defectors, and others, have an internal consistency suggesting they cannot be discarded without additional and contradictory information of a higher order. What this means is that any estimates of Soviet military manpower must be constructed so as to fit within the parameters framed by these two bodies of information. Tools of estimation and projection that do not allow for these limits must be held open to question.

Overestimation of Soviet military manpower can stem from several sources. First is the ever-present potential for double counting or for counting individuals who are essentially uniformed civilians (e.g., medical service personnel) in military manpower totals. A second source stems quite naturally from the fact that estimates of Soviet force posture are derived for the practical purpose of assessing threat. It is reasonable to use estimation techniques with asymmetric bias because it is the greater disaster to underestimate the power of a potential adversary. However, using such techniques without the checks provided by an analysis including demographic and institutional insights can lead to circularity that will quickly expand estimates beyond reasonable bounds.

The analysis also suggested other specific factors that could cause military manpower estimates to err. Substantial increases in manpower could be perceived if the readiness status of units is overestimated. There would be a primary effect, stemming from miscalculation of the number of men under arms in combat divisions, but also a secondary

effect if multipliers and rules of thumb based upon these numbers are then used to estimate the size of ancillary and support units. To estimate the "tail" in this manner might be to miss the importance of a means for balancing the military manpower equation: adjusting the size of rear area and support services to shifts in conscript supply and service demands. The difficulty of detecting major changes in the support forces might reinforce the apparent validity of the erroneous estimates of the combat forces if the rules of thumb are then applied in reverse.

It should also be noted that a consistent time series of force manpower figures is rarely the goal of estimation. Rather, the question asked by the consumers of such estimates is, "what lies on the other side of the hill--today." There is little constituency for going back over past estimates and comparing them with the widening set of information available in retrospect. Yet, this is one of the few ways of detecting the presence of systematic biases affecting the estimates that are currently being generated. Of the three main sources of information used in this paper, it is the estimate of actual military manpower that must be brought into conformity with what we know of the underlying demographics and institutions.

APPENDIX A
DERIVATION OF THE CONSCRIPT SHORTFALL MODEL

The number of conscripts required by the military each year is given by the following series of equations:

$$C_{D_t} = k_c * MIL_t * 12/\tau \quad (A.1)$$

$$k_c = 1 - k_o - k_1 \quad (A.2)$$

$$\tau = 24*\phi_2 + 36*\phi_3 \quad (A.3)$$

and

$$\phi_2 + \phi_3 = 1 \quad (A.4)$$

where

C_{D_t} = the number of conscripts demanded in year t

MIL_t = the total number of men in the military in year t

k_c = the fraction of MIL_t that must be conscripts

k_o = the fraction of MIL_t who are officers and cadets

k_1 = the fraction of MIL_t who are long-term enlisted personnel

τ = the average term of service in months of a conscript

ϕ_2 = the fraction of conscripts whose term is two years

and ϕ_3 = the fraction of conscripts whose term is three years.

The actual shortfall (if negative) or surplus (if positive) of potential conscripts to meet the conscript demand stated in equation B.1 is given by:

$$\zeta_t = POOL_{18_t} * r_{18} + POOL_{19_t} * r_{19} + POOL_{20_t} * r_{20} - C_{D_t} \quad (A.5)$$

where

ζ_t = the shortage (surplus) of eligible males to fill the conscript slots demanded in year t

$POOL_{i_t}$ = the pool of all males of age i in year t

and r_i = the rate at which males of age i are available for conscription

The size of the various age pools for each year t is determined as follows.

If $C_{D_{t-1}} \leq POOL_{18_{t-1}} * r_{18}$ (A.6.1)

then, $POOL_{19_t} = POOL_{18_{t-1}} (1-m_{18}) - C_{D_{t-1}}$ (A.6.2)

where

m_{18} = the mortality rate for 18-year olds.

Otherwise, the size of the 19-year old pool is given by

$POOL_{19_t} = POOL_{18_{t-1}} (1-m_{18}) (1-r_{18})$ (A.6.3).

Similarly, the pool of 20-year olds is determined as follows.

If $C_{D_{t-1}} \leq POOL_{18_{t-1}} * r_{18} + POOL_{19_{t-1}} * r_{19}$ (A.7.1)

then, $POOL_{20_t} = POOL_{19_{t-1}} (1-m_{19}) - (C_{D_{t-1}} - POOL_{18_{t-1}} . r_{18})$ (A.7.2)

Otherwise, the size of the 20-year old pool is given by

$POOL_{20_t} = POOL_{19_{t-1}} (1-m_{19}) (1-r_{19})$ (A.7.3)

Finally, the fraction of the conscript requirement that is not met in any year t, leading to a shortfall, is given by

$\Psi_t = \zeta_t / C_{D_t}$ (A.8)

where

Ψ_t = is the fraction of the conscript requirement not met (if negative) by the pool of available males.

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